

CLAIMS

What is claimed is:

1. A process for forming a dielectric film on an exposed surface of a layer containing silicon in a chamber, said process comprising:
determining the desired thickness of a layer of said dielectric film, said dielectric film including silicon dioxide and silicon nitride therein when formed on said exposed surface of said layer containing silicon;
heating said exposed surface of said layer containing silicon to a temperature in the range of at least 600°C and to 1100°C;
providing a gaseous mixture including nitrous oxide exhibiting a partial pressure, ozone exhibiting a partial pressure, at least one compound containing a halogen selected from the group consisting of Cl₂, Br₂, HCl and HBr, and steam, the partial pressure of the ozone being at least one tenth the partial pressure of the nitrous oxide in the gaseous mixture, the gaseous mixture being substantially free of fluorine-containing gases; and
subjecting said exposed surface of a layer containing silicon to the gaseous mixture including at least nitrous oxide, ozone, at least one compound containing a halogen selected from the group consisting of Cl₂, Br₂, HCl and HBr, and steam for a period sufficient to form the dielectric film to the desired thickness.
2. The process of claim 1, wherein said chamber is sealed.
3. The process of claim 2, wherein said chamber is maintained at a pressure within a range of 1 to 7,600 torr.
4. A process for forming a field-effect transistor gate dielectric layer on an exposed surface of a layer of polycrystalline silicon having a desired thickness in a chamber, said process comprising:

determining the desired thickness of a layer of said field-effect transistor gate dielectric film, aid dielectric film containing silicon dioxide and silicon nitride when formed on said exposed surface of said layer containing silicon;

heating said exposed surface of said layer of polycrystalline silicon to a temperature in the range of at least 600°C to 1100°C;

providing a gaseous mixture including nitrous oxide, ozone, at least one compound containing a halogen selected from the group consisting of Cl₂, Br₂, HCl and HBr, and steam, the gaseous mixture being substantially free of fluorine-containing gases; and

subjecting said exposed surface of said layer of polycrystalline silicon to the gaseous mixture including nitrous oxide gas at a partial pressure and ozone gas at a partial pressure, the partial pressure of the ozone gas being at least one tenth the partial pressure of the nitrous oxide, for a period sufficient to form said field-effect transistor gate dielectric layer to the desired thickness.

5. The process of claim 4, wherein said chamber is sealed.
6. The process of claim 4, wherein said chamber is maintained at a pressure within a range of 1 to 7,600 torr.